Experiment-3.2

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Aim: Case studies on Cloud based machine-learning solutions in healthcare.

Theory:

Cloud-based machine learning (ML) solutions have gained significant traction in healthcare due to their ability to handle large datasets, facilitate collaboration, and provide scalable computing resources. Here are some key ways in which cloud-based machine learning is being applied in healthcare:

1. Diagnostic Imaging:
   - Image Recognition: ML algorithms on the cloud can analyze medical images, such as X-rays, MRIs, and CT scans, to aid in the diagnosis of diseases like cancer, fractures, or neurological disorders.
   - Deep Learning Models: Deep learning models, particularly convolutional neural networks (CNNs), are employed for tasks like tumor detection, segmentation, and classification.
2. Clinical Decision Support Systems:
   - Predictive Analytics: Cloud-based ML models can analyze patient data to predict disease progression, readmission risks, and potential complications.
   - Decision Support: ML algorithms assist healthcare professionals in making more informed decisions based on patient history, current symptoms, and relevant medical literature.
3. Drug Discovery and Development:
   - Virtual Screening: ML algorithms assist in virtual screening of potential drug candidates, saving time and resources in the drug discovery process.
   - Biomarker Discovery: Cloud-based ML tools help identify potential biomarkers for diseases and predict responses to specific treatments.
4. Remote Patient Monitoring:
   - Wearable Devices: ML algorithms analyze data from wearable devices to monitor and predict health conditions, enabling timely interventions and reducing hospital readmissions.
   - Continuous Monitoring: Cloud-based solutions facilitate continuous monitoring of patients with chronic conditions, improving the overall management of health.
5. Natural Language Processing (NLP) in Healthcare:
   - Electronic Health Record (EHR) Analysis: NLP algorithms on the cloud extract valuable information from unstructured clinical notes, aiding in clinical research and decision-making.
   - Voice Recognition: Cloud-based solutions enable voice-activated systems that assist

healthcare professionals in documenting patient information efficiently.

6. Collaboration and Data Sharing:
    - Interoperability: Cloud platforms allow for seamless integration and sharing of healthcare data, fostering collaboration among healthcare providers, researchers, and institutions.
    - Multi-Center Studies: Cloud-based solutions facilitate multi-center studies by providing a centralized platform for data storage, processing, and analysis.
7. Security and Compliance:
    - Data Security: Cloud service providers implement robust security measures to protect sensitive healthcare data, often meeting industry-specific compliance standards such as HIPAA (Health Insurance Portability and Accountability Act).
    - Scalability: Cloud infrastructure allows for the scalability of resources based on demand, ensuring that healthcare organizations can adapt to changing computational needs.
8. Prescribing ML for new use cases
9. In our use and exploration of AI/ML in our platform, we go beyond pure AI tools by including human-in-the-loop programs and treatments. For example, we provide coaches, therapists, and dieticians that work with each individual patient, providing tips, strategies, and accountability. Our patient-provider interactions are digitized and stored, giving us a robust training dataset that we can now operationalize using all of the Google tools available. Using these provider interactions, we can track a patient's progress to ensure they've improved their health outcomes, whether it's weight loss, stress reduction, blood sugar management or beyond.
10. We want to endow our providers with superhuman powers, which means using AI/ML to manage and automate all of the tasks that aren't member-facing, freeing up the providers to focus their time and energy on their patients. We're currently experimenting with our Google tools around transcribing the provider's consultation notes and then applying data analysis to uncover insights that will lead to better health outcomes. Other time-saving solutions on our roadmap for providers include pre-filling standard fields in the chat function and managing end- of-day approvals.
11. We're currently using BigQuery ML for our "next action recommender," a member-facing feature on our mobile app that recommends the next step a patient can take in their treatment, based on past datasets of information provided by the patient. At the start of their journey, the steps might be basic, such as scheduling a consultation, adding a health tracker, or watching a health video. But the longer a patient uses our platform, the more sophisticated the recommendation system gets.
12. On the provider side, we have our Vidapedia, a comprehensive list of protocols for treatments that providers can follow. In the past year we've invested in Vidapedia cards, which are distinct sets of clinical protocols that have been codified. We're up to 150 cards, and instead of providers needing to keep all of that information in their heads, we're working on using BigQuery ML to extract the actions a patient has taken so far in their treatment. Using that data, we'll then recommend to the provider the most relevant cards that apply to the specific conditions. Having that information at their fingertips reduces the amount of time they need to spend on each member offline, which helps us build efficiency and lower the cost of delivering care.